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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,874	07/30/2001	Seth Marder	21182-7067	3252

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David Maher
Bingham McCutchen LLP
Three Embarcadero Center
Suite 1800
San Francisco, CA 94111

EXAMINER

METZMAIER, DANIEL S

ART UNIT	PAPER NUMBER
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1712

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/918,874	MARDER ET AL.	
	Examiner	Art Unit	
	Daniel S. Metzmaier	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,4,6 and 7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 3 is/are allowed.
- 6) ☒ Claim(s) 4,6 and 7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>05/02/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 3-4 and 6-7 are pending.

Election/Restrictions

1. Claims 6-7 have been examined to the extent they read on the elected species. The remaining species in the claims have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on April 16, 2004 and acknowledged in the Office action mailed July 9, 2004.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4 and 6-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Each of the claimed sections defining "R_{a1}, R_{a2}, and R_{a3}" list as a species the phrase "derivatives thereof" but fail to disclose what are said derivatives by example and/or adequate description. Referring to the instant specification at page 22, lines 17 et seq, applicants set forth the substituents are "derived essentially from" a list of species also set forth in the claims, which includes "derivatives thereof". Applicants define "derived essentially" as a compound such as

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amino acid that a closely related or trivial modification of said compound such as amino acid. Applicants do not define with any specificity what are said "derivatives". Thus, the claims are vague and indefinite regarding the metes and bounds of the subject matter, which applicants intend.

A similar situation exists for the claimed sections defining " R_e-R_m " and " R_{g1} , R_{g2} , and R_{g3} ".

Additionally, applicants provide no definition via example or description of what is intended by the meaning of "polymerizable functionalities" as a species of " R_e-R_m " in each of the claims. It is unclear what are the metes and bounds of the claimed subject matter sought for a patent.

It is unclear and applicants fail to provide adequate written description for the broad terms employed in the claims as noted herein above.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

4. Claims 4 and 6-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants should review each of the alternative groupings for proper format and clarity. For example each of the claim sections defining " R_a , R_b , R_c , and R_d " should have a "semi-colon" (;) after " $1 < \beta < 25$ " rather than a comma.

Each of the claimed sections defining " R_{a1} , R_{a2} , and R_{a3} " list as a species the phrase "derivatives thereof" but fail to disclose what are said derivatives by example

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and/or adequate description. Referring to the instant specification at page 22, lines 17 et seq, applicants set forth the substituents are "derived essentially from" a list of species also set forth in the claims, which includes "derivatives thereof". Applicants define "derived essentially" as a compound such as amino acid that a closely related or trivial modification of said compound such as amino acid. Applicants do not define with any specificity what are said "derivatives". Thus, the claims are vague and indefinite regarding the metes and bounds of the subject matter, which applicants intend.

A similar situation exists for the claimed sections defining " R_e-R_m " and " R_{g1} , R_{g2} , and R_{g3} ".

Additionally, applicants provide no definition via example or description of what is intended by the meaning of "polymerizable functionalities" as a species of " R_e-R_m " in each of the claims. It is unclear what are the metes and bounds of the claimed subject matter sought for a patent.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical

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Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000.

Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. Claim 4 is rejected under 35 U.S.C. 102(b) as being anticipated by Sekisui Chem Ind KK, JP 02-187734A¹, as evidenced by Derwent Abstract, AN 90-265816/35 and partial translation. Sekisui Chem Ind KK discloses compounds reading on those employed in the claimed methods for use in semiconductor lasers. The step of two-photon absorption would have been inherent to the Sekisui Chem Ind KK compounds used as disclosed therein. Sekisui Chem Ind KK (column 12 as shown in the partial translation) discloses the method of subjecting the disclosed compounds to an Nd:YAG laser beam at 1.064 μm (1064 nm) wavelength and 10-mJ/pulse outputs. Since the energy units are given in mJ/pulse, it is reasonable to conclude that the laser beam employed in the Sekisui Chem Ind KK reference is a pulsed laser.

Furthermore, the result of irradiation with said laser produces a second harmonic generation, thereby observing green light at a wavelength of 532 nm, which is $\frac{1}{2}$ the incident light. The relaxation of the excited state to emit 2x the energy of the incident radiation / $\frac{1}{2}$ the wavelength is evidence that at least some simultaneous multi-photon absorption occurs in the process as inherent to the production of the second harmonic generation resulting from the pulsed laser irradiation of the same compounds.

¹ Cited in applicants Information disclosure statement.

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Applicants' claims lack any limitations of the degree or amount of multi-photon absorption, the wavelength, or the result of the multi-photon absorption. The methods require irradiating a compound that is claimed with incident radiation to cause a multi-photon absorption and converting the compound to a multi-photon excited state. The wavelengths of the multiple photons are not required to be the same.

7. Claims 4, 6, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Puccetti et al, "Chain-Length Dependence of the Third-Order Polarizability of Disubstituted Polyenes. Effects of End Groups and Conjugation Length", *J. Phys. Chem.*, 1993, 97, pp. 9385-9389². Puccetti et al (particularly page 9386 and 9387) disclose compounds reading on those employed in the claimed process (regarding claims 6 and 7, when $m = 0$), which are measured employing a pulsed Nd:YAG lasers to measure the second and third harmonic generation.

The result of irradiation with said laser produces a second or third harmonic generation, thereby resulting in relaxation, which is at least $\frac{1}{2}$ the incident light. The relaxation of the excited state to emit 2x or 3x the energy of the incident radiation / at least $\frac{1}{2}$ the wavelength is evidence that at least some simultaneous multi-photon absorption occurs in the process as inherent to the production of the second harmonic generation resulting from the pulsed laser irradiation of the same compounds.

Applicants' claims lack any limitations of the degree or amount of multi-photon absorption, the wavelength, or the result of the multi-photon absorption. The methods require irradiating a compound that is claimed with incident radiation to cause a multi-

² Reference is cited in applicants IDS.

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photon absorption and converting the compound to a multi-photon excited state. The wavelengths of the multiple photons are not required to be the same.

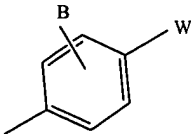
Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 4, 6, and 7 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Prasad et al, US 5,912,257. Prasad et al (abstract ; column 10, lines 40 et seq ; column 37-38, lines 64 et seq; and claims) discloses styryl dyes that exhibit two-photon absorption. Prasad et al further discloses the compounds that read on those compounds employed in the instant

claimed methods when Q is , wherein B is alkoxy and W is an acceptor

group, such as those set forth in Prasad et al (column 17, lines 21 et seq) including $-\text{NO}_2$, $-\text{CN}$, or sulfates. Said groups and the compounds having said groups are clearly envisaged and read on the claimed groups defined by " $\text{R}_e\text{-R}_m$ " in claims 4, 6, and 7.

To the extent Prasad et al differs from the claims in the disclosure of the methods with due to the breadth of the compounds employed, the fact that the reference discloses several possible combinations does not make any particular combination less obvious. Said compounds are employed for the same process of producing a multi-photon absorption and would have been obvious to one having ordinary skill in the art at the time of the invention for the utilities disclosed in the Prasad et al reference.

Allowable Subject Matter

11. Claim 3 is allowed.

Response to Arguments

12. Applicant's arguments filed Oct 24, 2005 have been fully considered but they are not persuasive.

13. Applicants assert that claims 6 and 7 read on the elected species. Claims 6 and 7 have been examined only to the extent that they read on the elected species. It is further noted that

Applicants (page 14 et seq) assert each and every element of the claim must be present for an anticipation rejection and the reference lacks a teaching of a two-photon absorption. Attention is directed to MPEP 2112(III)-(V) wherein the same compounds in

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the method claims are exposed to laser energy and thus, would have been expected to inherently form at least some two-photon absorption. Where the compounds treated and the steps acting on said compounds are indistinct from the claims, it is reasonable to expect the compounds to have the properties of the claimed invention. It is a well known tenet in patent law that a compound and all of its properties are generally inseparable. *In re Papsech*, 315 F2d. 381, 137 USPQ 43, (CCPA 1963). The absorption properties are a property of the compounds. Sekisui Chem Ind KK disclose the irradiation of the compounds with a pulsed Nd:YAG laser resulting in second harmonic generation and the relaxation of 2x the energy / $\frac{1}{2}$ the wavelength, which is evidence of the multi-photon absorption.

14. Applicants arguments regarding the lack of a use of the Sekisui compounds in lasers or a nexus between their use as nonlinear optical properties and two photon absorption are not deemed persuasive since the Sekisui abstract specifically discloses the compounds are employed in laser wavelength conversion. Since the property is inherent to the compounds and the energy from the Nd-YAG laser (column 12, lines 1-2) would have been expected to result in at least some two-photon absorption. See also instant ¶ [0403] of corresponding US PGPUB 2002/0185634, which discusses the use of Nd-YAG as a common laser for generating the two-photon absorption.

Furthermore, the relaxation from the excited state is twice the energy of the incident radiation. It is reasonable to conclude the frequency doubling results from two-photon absorption. The quantum mechanics of the two-photon absorption are only

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defined in the claims as simultaneous, which have been defined by applicants as two events occurring within a period of 10^{-14} seconds.

15. Applicants arguments regarding the lack of two-photon absorption in Sekisui do not rebut said rejection. Attention is directed to MPEP 2112(II).

16. Applicants' (page 15) broad definition of nonlinear optical materials in response to increasing intensity of light is not probative to rebut the disclosure of wavelength conversion disclosed by subjecting the compounds to a pulsed Nd:YAG laser at 1064 nm.

17. Applicants' description (pages 15 and 16) of a laser is not probative since the compounds of Sekisui are employed for wavelength conversion and not to generate the laser light initially.

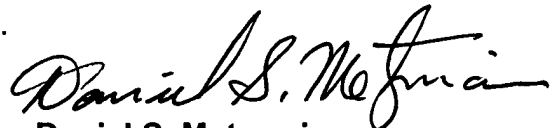
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Metzmaier whose telephone number is (571) 272-1089. The examiner can normally be reached on 9:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel S. Metzmaier
Primary Examiner
Art Unit 1712

DSM